



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/539,679  | 06/16/2005  | Tohru Nakagawa       | 5077-243/NP         | 8419             |
| 53800 7590 04/25/2008<br>GREGORY A. STOBBS<br>5445 CORPORATE DRIVE<br>SUITE 400<br>TROY, MI 48098 |             |                      |                     |                  |
| EXAMINER  |             |                      |                     |                  |
| MRUK, GEOFFREY S  |             |                      |                     |                  |
| ART UNIT  |             | PAPER NUMBER         |                     |                  |
| 2853  |             |                      |                     |                  |
| MAIL DATE   |             | DELIVERY MODE        |                     |                  |
| 04/25/2008  |             | PAPER                |                     |                  |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

## Application No.

10/539,679

## Applicant(s)

NAKAGAWA ET AL.

## Examiner

Geoffrey Mruk

## Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) 5-12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/5508)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al. (US 5,475,279) in view of Tatsuki et al. (US 4,849,384).

With respect to claim 1, Takeuchi discloses a piezoelectric element comprising a first electrode (Fig. 1, element 75) a second electrode (Fig. 1, element 77) and a lead compound-containing piezoelectric body (Fig. 1, element 79) sandwiched between the first and second electrodes, wherein the piezoelectric body is made of an aggregate of a plurality of crystals (Column 6, lines 21-31), zirconium oxide exists at a grain boundary between the crystals (Column 6, lines 44-54).

With respect to claim 2, Takeuchi discloses the piezoelectric body (Fig. 1, element 79) is made of an aggregate of a plurality of columnar crystals (Column 6, lines 21-31), which are oriented from one end to the other of the piezoelectric body in the thickness direction thereof (Column 6, lines 44-49, i.e. crystal phase).

With respect to claim 3, Takeuchi discloses the piezoelectric body (Fig. 1, element 79) contains at least zirconium element, titanium element, lead element, and oxygen element (Column 7, lines 30-41).

With respect to claim 4, Takeuchi discloses an inkjet head comprising: a head body (Fig. 1, element 40) including a nozzle (Fig. 1, element 54) and a pressure chamber (Fig. 1, element 46) which is communicated with the nozzle and contains ink; and a piezoelectric element (Fig. 1, element 78) which is arranged to face the pressure chamber at part of one of its surfaces intersecting the thickness direction of the piezoelectric element and applies a pressure to the ink in the pressure chamber such that the ink is discharged from the nozzle to a recording medium (Column 6, line 60 – Column 4, line 2), wherein the piezoelectric element includes a first electrode (Fig. 1, element 75), a second electrode (Fig. 1, element 77) and a lead compound-containing piezoelectric body (Fig. 1, element 79) sandwiched between the first and second electrodes, the piezoelectric body is made of an aggregate of a plurality of crystals (Column 6, lines 21-31), zirconium oxide exists at a grain boundary between the crystals (Column 6, lines 44-54).

However, Takeuchi fails to disclose the zirconium element exists at the grain boundary in a larger composition ratio than lead element.

Tatsuki discloses a dielectric porcelain where zirconium element exists at the grain boundary in a larger composition ratio than lead element (Table 2, samples 17-19).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the compositions disclosed by Tatsuki in the piezoelectric actuator of Takeuchi. The motivation for doing so would have been "to provide a dielectric porcelain formed of a dielectric material having a high dielectric constant, a low

Art Unit: 2853

dielectric loss and positive temperature characteristics of the dielectric constant or negative temperature characteristics of the resonance frequency" (Column 2, lines 12-17).

### ***Response to Arguments***

Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Geoffrey Mruk whose telephone number is (571)272-2810. The examiner can normally be reached on Monday-Friday 7:30am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2853

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/G. M./  
Examiner, Art Unit 2853  
4/23/2008

/STEPHEN D. MEIER/  
Supervisory Patent Examiner, Art Unit 2853